

WHAT IS CLAIMED IS:

1. A system for wavelet analysis of one or more acoustic signals to identify one or more anomalies in an object, the system comprising:

5 a library of one or more reference wavelet power spectra that each correspond to one or more objects that comprise one or more known anomalies; and
an analysis module operable to:

receive an acoustic signal from an acoustic scan of an object;
calculate a wavelet power spectrum of the acoustic signal;
access the library;

10 compare the wavelet power spectrum with one or more reference wavelet power spectra;

if the wavelet power spectrum from the acoustic scan corresponds to one or more reference wavelet power spectra, communicate analysis results indicating that the object under analysis comprises one or more particular
15 known anomalies corresponding to the one or more reference wavelet power spectra that correspond to the wavelet power spectrum; and

if the wavelet power spectrum does not correspond to one or more reference wavelet power spectra, communicate analysis results indicating that the object under analysis lacks the one or more known anomalies that the one
20 or more reference wavelet power spectra in the library correspond to.

2. The system of Claim 1, wherein a wavelet transform is used to calculate the wavelet power spectrum of the acoustic signal from the acoustic scan of the object.

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3. The system of Claim 1, wherein a Morlet basis function is used to calculate the wavelet power spectrum of the acoustic signal from the acoustic scan of the object.

4. The system of Claim 1, wherein one or more locations of the one or more anomalies with respect to the object are determined according to the acoustic scan of the object.

5 5. The system of Claim 1, wherein a C-Mode Scanning Acoustic Microscope (C-SAM) is used to take the acoustic scan of the object.

6. The system of Claim 1, wherein the object is a solder bump of an integrated circuit (IC) package.

7. A method for wavelet analysis of one or more acoustic signals to identify one or more anomalies in an object, the method comprising:

receiving an acoustic signal from an acoustic scan of an object;

calculating a wavelet power spectrum of the acoustic signal;

5 accessing a library of one or more reference wavelet power spectra that each correspond to one or more objects that comprise one or more known anomalies;

comparing the wavelet power spectrum with one or more reference wavelet power spectra;

10 if the wavelet power spectrum from the acoustic scan corresponds to one or more reference wavelet power spectra, communicating analysis results indicating that the object under analysis comprises one or more particular known anomalies corresponding to the one or more reference wavelet power spectra that correspond to the wavelet power spectrum; and

15 if the wavelet power spectrum does not correspond to one or more reference wavelet power spectra, communicating analysis results indicating that the object under analysis lacks the one or more known anomalies that the one or more reference wavelet power spectra in the library correspond to.

8. The method of Claim 7, wherein a wavelet transform is used to
20 calculate the wavelet power spectrum of the acoustic signal from the acoustic scan of the object.

9. The method of Claim 7, wherein a Morlet basis function is used to
25 calculate the wavelet power spectrum of the acoustic signal from the acoustic scan of the object.

10. The method of Claim 7, wherein one or more locations of the one or more anomalies with respect to the object are determined according to the acoustic scan of the object.

11. The method of Claim 7, wherein a C-Mode Scanning Acoustic Microscope (C-SAM) is used to take the acoustic scan of the object.

5 12. The method of Claim 7, wherein the object is a solder bump of an integrated circuit (IC) package.

13. Software for wavelet analysis of one or more acoustic signals to identify one or more anomalies in an object, the software embodied in computer-readable media and when executed operable to:

- receive an acoustic signal from an acoustic scan of an object;
- 5 calculate a wavelet power spectrum of the acoustic signal;
- access a library of one or more reference wavelet power spectra that each correspond to one or more objects that comprise one or more known anomalies;
- compare the wavelet power spectrum with one or more reference wavelet power spectra;
- 10 if the wavelet power spectrum from the acoustic scan corresponds to one or more reference wavelet power spectra, communicate analysis results indicating that the object under analysis comprises one or more particular known anomalies corresponding to the one or more reference wavelet power spectra that correspond to the wavelet power spectrum; and
- 15 if the wavelet power spectrum does not correspond to one or more reference wavelet power spectra, communicate analysis results indicating that the object under analysis lacks the one or more known anomalies that the one or more reference wavelet power spectra in the library correspond to.

20 14. The software of Claim 13, wherein a wavelet transform is used to calculate the wavelet power spectrum of the acoustic signal from the acoustic scan of the object.

25 15. The software of Claim 13, wherein one or more locations of the one or more anomalies with respect to the object are determined according to the acoustic scan of the object.

16. The software of Claim 13, wherein a C-Mode Scanning Acoustic Microscope (C-SAM) is used to take the acoustic scan of the object.

17. The software of Claim 13, wherein the object is a solder bump of an integrated circuit (IC) package.

18. A system for wavelet analysis of one or more acoustic signals to identify one or more anomalies in an object, the system comprising:

means for receiving an acoustic signal from an acoustic scan of an object;

means for calculating a wavelet power spectrum of the acoustic signal;

5 means for accessing a library of one or more reference wavelet power spectra that each correspond to one or more objects that comprise one or more known anomalies;

means for comparing the wavelet power spectrum with one or more reference wavelet power spectra;

10 means for, if the wavelet power spectrum from the acoustic scan corresponds to one or more reference wavelet power spectra, communicating analysis results indicating that the object under analysis comprises one or more particular known anomalies corresponding to the one or more reference wavelet power spectra that correspond to the wavelet power spectrum; and

15 means for, if the wavelet power spectrum does not correspond to one or more reference wavelet power spectra, communicating analysis results indicating that the object under analysis lacks the one or more known anomalies that the one or more reference wavelet power spectra in the library correspond to.

19. A system for wavelet analysis of one or more acoustic signals to identify one or more defects in a solder bump of an integrated circuit (IC) package, the system comprising:

- 5 a library of one or more reference wavelet power spectra that each correspond to one or more solder bumps that comprise one or more known defects; and
- an analysis module operable to:
 - receive an acoustic signal from an acoustic scan of a solder bump;
 - calculate a wavelet power spectrum of the acoustic signal using a Morlet basis function;
 - 10 access the library;
 - compare the wavelet power spectrum with one or more reference wavelet power spectra;
 - if the wavelet power spectrum from the acoustic scan corresponds to one or more reference wavelet power spectra, communicate analysis results
 - 15 indicating that the solder bump under analysis comprises one or more particular known defects corresponding to the one or more reference wavelet power spectra that correspond to the wavelet power spectrum; and
 - if the wavelet power spectrum does not correspond to one or more reference wavelet power spectra, communicate analysis results indicating that
 - 20 the solder bump under analysis lacks the one or more known defects that the one or more reference wavelet power spectra in the library correspond to.